An efficient method for the calculation of eigenvector design sensitivities

Abstract

This paper describes a general approach for incorporating the eigenvector normalization condition in the computation of eigenvectordesign sensitivities. Design sensitivities for the eigenproblem has received much attention over the past four decades, however, with little exception, previous work has focused primarily on mass normalized eigenvectors alone. The approach presented here considers conservative symmetric systems with distinct eigenvalues and addresses first-order eigenvalue and eigenvector design sensitivities. A rigorous treatment ofthe eigenvector normalization condition is provided by using its design derivative to eliminate the singularity issue in the eigenvector design sensitivity system ofequations. The effect of re-scaling eigenvectors is also considered, as is the related computational effort. Examples illustrate the computational procedure.